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Evolving Sustainable Design Approaches in Architectural Practice and Education

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Abstract

This paper responds to three missing dimensions that continue to exemplify sustainable design in professional practice and education: a) the absence of socio-behavioral aspects from sustainability discourse, b) the reliance on top-down policies and guidance documents, and c) the lack of attention given to contextual aspects. The paper offers two major approaches, which can be utilized as initiatives for professional actions or as advances in contemporary thinking about sustainability as it relates to education in architecture and urbanism. The first approach offers a critique on the notion of guidelines and adopts bottom up design strategies that enable the inclusion of social and cultural issues relevant to the users of the environment. The second approach adopts the premise that architecture should contribute to the larger matrix of sustainable urbanism, and argues that this must start with the education of future architects based on a holistic understanding of how the built environment is produced. The two approaches are interwoven into a concluding discussion that aims at advancing the future discourse about sustainable built environments.

Keywords: Sustainable design; guidance documents; socio-behavioral aspects; community involvement; sustainable urban qualities.

1. Introduction

Sustainability as a professional paradigm has become at the core of almost every single built environment related discipline. There is a great deal of discourse and actions in design, planning, architecture, and construction circles on creating sustainable environments. There are also widely varying opinions as to how sustainability can be introduced and approached. Current research indicates that the term encompasses more than the physical and economic aspects. It includes socio-cultural, and socio-behavioral dimensions. Observing contemporary architectural practices, however, reveals that there are three missing dimensions. The first is that there is a continuous emphasis on the physical and technical aspects of sustainability, while socio-cultural and socio-behavioral dimensions are ignored at worst or oversimplified at best. The second is that there is a heavy reliance on top-down policies and strategies with the aim of developing guidelines to be implemented for the betterment of environments. Strikingly, this takes place at the expense of other bottom-up strategies that aim at sensitizing users toward understanding the key issues underlying sustainability.

While the first two missing dimensions represent shortcomings in the practice of sustainable design, they also have negative impact on architectural education. Yet, a third missing dimension can be envisioned when looking at how sustainability is addressed in architectural education, simply a focus on the building itself as an isolated entity with little attention to the sustainability of the larger context.

In essence, addressing these missing dimensions offers a rationale for the professional community

and architectural educators worldwide to use sustainability not just as a term in their daily discourse but hopefully in their routine educational and professional practices.

This paper presents a positional view and builds on the earlier research of this author, which was developed over the past decade or so. It aims to reaching beyond the essentials and the nitty-gritty details of sustainable building design, and adopts complementary approaches, which attempt to cover the three missing dimensions.

The paper offers two major approaches, which can be utilized as initiatives for professional actions or as advances in contemporary thinking about sustainability as it relates to architectural and urban education. The first approach offers a critical voice on the notion of guidelines and adopts bottom up design strategies that enable the inclusion of social and cultural issues relevant to the users of the environment. Adopting the premise that architecture should contribute to the larger matrix of sustainable urbanism, the second framework is pertinent to architectural education and is built on a holistic understanding in the production of the urban environment.

2. Anatomy of Key Critical Issues

The development programs of international organizations such as the UN Center for Human Settlements (UNCHS); UN Environment Program (UNEP); International Union for the Conservation of Nature (IUCN); UN Development Program (UNDP), and the efforts of many government agencies around the world exemplify a new way of thinking, aimed at creating sustainable environments. Through the activities of these

organizations, ecological consciousness was raised as a reaction to the overall and overwhelming global environmental degradation. During the last decade or so, many professional gatherings have addressed the environmental issues on the policy-making levels. Law, policy, and decision makers have tailored lengthy regulations and guidance documents in order to maintain a sense of responsibility toward the environment. In this context, architects and planners find themselves under the pressure of implementing those regulations. With this fast pace of action, certain flaws emerge and act as impediments towards the full understanding of the way in which sustainable environments can be created. In this respect, a number of key issues can be identified to build the case for emphasizing the missing dimensions in both architectural practice and education.

2.1 The Attitude of Recycling Terminology in Practice and Education

Tracing back the trends on issues related to sustainability, one finds that architects and planners are in a continuous process of recycling terminology. In the fifties, the trend was "Good Design," while in the late sixties and early seventies this term was replaced by "Energy Conscious Design." In the seventies, the oil crisis led to an increased concern for energy, but the attitude of being conscious of energy-related issues was not enough. Thus, the term was replaced, becoming "Energy Efficient Design." In the nineties "Sustainability" was introduced as a new term associated with the fields of design, planning, and building, and the overall development process. In the years 2001 and 2002, one notices a new term started to appear, which attempts to replace sustainability; that is "High Performance Buildings." Those who advocate this term claim that it covers more issues and is more inclusive of a wide variety of concerns [1].

It is believed that recycling terminology is a professional attitude that has a tremendously negative impact. The reason is that the public does not understand the language that professionals use, and is confused about the terminology they introduce. With this understanding, sustainability or sustainable design is simply a rephrasing of some of the forgotten values of traditional architecture and urbanism.

2.2 The Lack of a Comprehensive Understanding of the "Sustainability"

Reviewing the literature on sustainability, one finds two schools of thought. Some definitions place emphasis on environment and economics, while others implicitly integrate social and cultural dimensions. On the one hand, the statements made by Lyle (1993) and Davies (1994) exemplifies the definitions that focus on environmental criteria. Lyle reports, "The objective of sustainability is to provide intentionally designed and managed ecosystems that represent symbiosis of urban and natural

processes"[2]. Davies (1994) places emphasis on the same criteria but argues that "The aim is to avoid the shortcomings in our culture in terms of the way we presently build and live, and re-introduce building as a process, which is concerned with the impact it has on the people and the environment involved"[3]. On the other hand, incorporating socio-cultural aspects into environmental issues can be envisaged within the statements adopted by international bodies. Derived from the principles developed in the RIO declaration (1992), sustainability is seen as "staying within the capacity of the natural environment while improving the quality of life and offering our children opportunities, at least as good as those available to us"[4]. The declaration of the World Congress of Architects (1993) reports, "we are socially, culturally, and environmentally independent. Sustainability in the context of this interdependence requires partnership, equity, and balance among all parties"[5]. More recent documents emphasize the need for such a balance [6,7].

The demystification of sustainability as a term corroborates that it is not limited to impacts on natural environments, but on people and communities as well. It involves two domains that should neither be ignored nor simplified, but instead integrated; these two domains are: economic-environmental and socio-cultural. The preceding two aspects of recycling terminology and the lack of comprehensive understanding contribute dramatically to how the public values what architects and planners do, the reliability of the knowledge they develop, the credibility of the visions they introduce, and the validity of the methods they employ.

3. Practice: Overcoming Difficulties with Sustainable Design Guidance Documents

The approach to overcoming the difficulties inherited in utilizing guidance documents concerns itself with design and built-environment related professions. Adopting bottom up design strategies that enable the inclusion of social and cultural issues relevant to the users of the environment this approach offers a critical view on the practice of guidelines while.

3.1 Critical View on the Practice of Guidance Documents

When investigating recent practices addressing sustainable building design, one can find that there are two major approaches: top-down and bottom-up. The top-down approach aims at developing policies, strategies, and standards. However, it has been heavily criticized of being more evaluative than informative, and that it relies on forcing the professional community and building users to respond to an issue before being aware of or have a grasp of it. The bottom-up approach aims at building public and professional awareness, while providing more automatic feedback mechanisms. It is more informative than evaluative and relies heavily on developing a common understanding, a common

language, and develops a sense of responsibility toward the environment. In recent years, however, emphasis has been placed upon the top-down approach, while ignoring or oversimplifying the bottom-up approach. In essence, it is argued here that both approaches are needed and none of them can replace the other.

Over the past decade or so, people have written standards and codes toward the creation of sustainable built environments. A question that can be raised is: Have these policies, strategies, and guidelines been transformed into real practices? [1]. Simply, the answer is that very few implemented examples exist, and many in the professional community agree on that. Again, the question here is: Why we do not find many built examples, in contrast to this accumulation of green knowledge, as developed in the last few years? One can argue that the problem lies with "Guidelines," as outlined in the following argument.

Guidelines are always rough, they are "not-illustrated," and they mainly address quantitative aspects. More importantly, they do not leave enough room, or give enough direction, for the creativity of the architect-planner. Guidelines are always generic and do not address specific building type. They also do not speak to building occupants, but recently started to address users and building types in a superficial manner. Some scholars believe that they represent the end of the process, and that by developing guidelines, socially and environmentally responsive built environments can be realized. In this respect, I would argue that no guidelines are ever final; if they are indeed adaptive they will evolve over time according to the changing circumstances. Therefore, they have to be strategically developed to respond to emerging needs and to the nature of the users. In fact, useful guidelines do not provide blueprints on how sustainability can be achieved; only a pretty good picture of what the future might be [8].

It must be noted, however, that there are problems associated with the bottom-up approach as well. It has been criticized in terms of its consumption of time. Some argue that the time invested in training programs and awareness campaigns is excessive. Although the results are far-reaching, the process takes time while developing positive attitudes toward the environment, and reconfiguring the culture of sustainable design, building, management, and operation [9].

3.2 Involving Users in Design Decision Making

Taking the learning environment as an example it is argued that involving the school community in design requires a highly intensive collaborative process with multiple layers. While such a process has a structured framework it is characterized by being flexible to meet the requirements of different design situations. It often begins with interviews and walkthrough evaluation of the existing facility. This establishes

the basis for an initial workshop where participants working in small groups write wish poems of their desires, free of any constraints. Special sessions are conducted with children or students based on the school type, these allow them to voice their opinion about their new school. Next, the school board and teachers develop a dialogue about their educational objectives, the variety of teaching methods generated from those objectives, and the types of spaces and places that would be supportive of these activities [10]. A follow-up design workshop and a site walkthrough are conducted to explore options and design concepts, while rediscovering the site and its constraints and realities. In these workshops the basic organization of the site and the school building(s) are discussed with consensus arrived at about the future direction to be pursued (Fig.1,2,3,4). Examples of involving a school community in decision-making processes accentuate the need for integrating pedagogical objectives, children behaviors, and occupants' needs into other physical elements that enhance the educational process while at the same time addressing relevant sustainable design issues [11,12].



Fig 1. Children drawing expressing their desire of the future of their school (Source: Courtesy of Adams Group Architects, 2004)



Fig 2. The final image of the school, a result of intensive collaborative process with school community (Source: Courtesy of Adams Group Architects, 2004)



Fig 3. Teachers in a group discussion for selecting the best classroom alternatives (Source: Courtesy of Adams Group Architects, 2004)



Fig 4. Integrating the learning environment with the natural context to provide more learning opportunities. (Source: Courtesy of Adams Group Architects, 2004)

3.3 PLADEW: Developing Awareness Tools as Part of the Sustainable Design Process.

In order to address other important bottom-up strategies complementing the involvement of the school community in design decision-making, an instrument was devised by the author as an awareness-raising tool where teachers can take a walking tour through their building [8,13]. It allows them to explore, think, comprehend, develop impressions, and deeper insights into the understanding of their environment from sustainability perspective.

The tool is named PLADEW and encompasses four sets of questions to examine the key issues of sustainable planning and design. Each set of questions pertains to one of the crucial factors: 1) Planning and Zoning, 2) landscaping, 3) Designing, and 4) Energy and Waste. The following procedures outline how the tool can be implemented:

- Conducting a self-guided tour, starting by the site and the surrounding context then interior spaces (teachers may inquire about some technical aspects and get feedback from personnel in charge of the utility system and maintenance)
- Numerical scores from 1 to 5 are assigned to each question underlying the factors (1= highly appropriate, 7= very inappropriate)
- Responding to each question underlying each factor
- Analyzing the numerical ratings by computation of average scores for each factor, then

computation for the overall scores of the building

- Developing concluding comments based on the overall appraisal, while highlighting positive and negative aspects

Validating PLADEW required testing it. Concomitantly, the tool was examined by delivering the tool to a sample of 40 teachers at the Carmel Christian School in Mathews, North Carolina. Teachers were asked to take a walking tour and assess their school building according to the questions underlying the four factors (Fig 5). Teachers were also asked to provide their feedback concerning any ambiguity of the questions or the terminology used, and also to add any questions they feel they are critical to be addressed. 15 teachers responded and few of them noted that they had difficulty understanding some of the terms. As a result a glossary of definitions was added to the tool and included definitions of terms such as buffer zone, site topography, gray water system, building shell ...etc. The tool has been implemented as a research tool to assess the learning environment as well as an awareness mechanism involving the school community in a collaborative process in the pre-design phase. The following sheet illustrates an example of one of the factors utilized and its underlying questions.

Table 1: Example Sheet of one of the factors utilized in PLADEW awareness tool (Source: Salama, 2005).

Factor 1: PLANNING AND ZONING Highly Appropriate 1 2 3 4 5 Very Inappropriate	Score
1. How does the building suit the most appropriate use of the surrounding area?	_____
2. How does the building encourage teachers, students, and visitors to respect the surrounding natural environment?	_____
3. How does the building encourage fostering and enhancing environmental education and awareness?	_____
4. How does the project alter or change the site topography?	_____
5. How does the orientation of the building and its components fit well with the orientation of the site and the climatic constraints? (consider the sun path and north-south orientation, day lighting).	_____
6. Is there a buffer zone around the site, and if so, is it suitable for protecting any surrounding significant natural features?	_____
7. Does the access to the site fit well with the existing natural landscape?	_____
8. Do the pedestrian paths and their angles of vision correspond to the natural scenes (if any) around the site?	_____
9. Are the entry points sufficient, easily accessible, and suitable for building size, number of students and teachers, site area, and dimensions?	_____
10. Are the entry points appropriate for minimizing any negative impacts on the	_____

surrounding natural environment?	
11. Are the motorways around the site suitable for and respecting the surrounding environment; natural and built? (<i>consider width of motorways and speed limits, safety aspects, ...etc.</i>).	_____
12. How does the project introduce any damaging, polluting, or waste generating activities?	_____
Average = Sum of Scores/12	_____



Fig 5. Teachers conducting a walking tour (Source: Courtesy of Adams Group Architects, 2004)

4. Education: Contributing to Sustainable Urban Qualities

Adopting the premise that architecture should contribute to the larger matrix of sustainable urbanism, this approach is pertinent to architectural education and is built on a holistic dimension in producing the built environment. In essence it relates the theory of space production 'conceived, perceived and lived space' of the French Sociologist Henry Lefebvre to the role architecture may play in producing three urban qualities, namely urban efficiency, urban diversity and urban identity.

4.1 Critical View on the Education of Architects

Due to the engineering and technical education of architects their understanding and use of sustainability has strongly emphasized the technical aspects required to construct ecological buildings. As a result, sustainable architecture is often taught in universities as a side subject or within a specialized program dealing with modern technologies and climate-appropriate design rather than an integral component of the curriculum [1,14]. The main responsibility of architects is to function as a moderator dealing with the demands concerning the design of a building in order to find the best compromise between client needs, actual users, and society as a whole [15]. Therefore, architecture students need to be prepared for this demanding role equipped with a more holistic understanding that caters to the various parties involved. Worldwide, there is a growing interest in addressing this reality through a variety of different courses and

studios that promote interdisciplinary thinking. However, the main focus of architectural pedagogy remains on the object, the building itself, without enough attention given to the role of that object in its wider context [1]. Thus, creativity and technical know-how are highly desired and promoted while research about how buildings are perceived by potential users, including investigations about social and cultural backgrounds, are usually neglected [16].

4.2 Lefebvre's Theory of Space Production

In order to initiate a more holistic understanding for integrating sustainability into architectural education, a theory of how built environments are produced is utilized as a basis. The work of the French sociologist and philosopher Henri Lefebvre has had a great impact on the contemporary understanding of space as a product of complex 'social superstructures' [17]. He argues that space cannot be understood as a simple collection of elements because a society's space is actually a product that has been created through its own individual spatial practice. In order to explain the idea of social space Lefebvre developed his frequently quoted triad of perceived, conceived and lived space [18] (Fig.6).

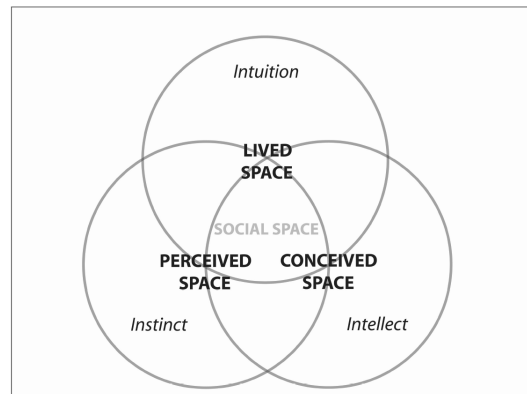


Fig. 6. Henri Lefebvre's triad of space production (Source: Wiedmann and Salama, 2012).

Lefebvre defined 'conceived space' as the space conceptualized by scientists, also known as 'representations of space'. These representations are abstract as they are rooted in the principles, beliefs and visions held by professionals, decision-makers and others who are in a position to impose their personal notion of 'order' on the concrete world and so create a practical impact on space within social and political practice [17]. 'Perceived space' is viewed as a space of 'spatial practice'. He defined it as the space where movement and interaction take place, where networks develop and materialize. Thus, it includes both daily routines on an individual level and networks as the result of collective movements. He maintains that the specific spatial practice of a society can only be assessed empirically by analyzing and studying the structure of its networks [17]. Due to the fact that spatial practice is empirically observable it is also referred to as the readable or visible space and can be subjected to investigation.

The 'lived space' is interrogated as the unconscious, non-verbal direct relation of humans to space. Also known as 'representational space,' it is directly lived through associated images and symbols [17]. It is essentially subjective wherein the outer physical space echoes with the inner imagination of individuals. Specific locations within given vicinity can, for example, become focal points due to their position and status within the representational space of a particular community of people who use that vicinity [17]. Apart from those three types of space, the production of social space as a whole has a direct impact on the environment and in the case of cities it materializes into the built reality.

4.3 Mapping Lefebvre's Theory on the Production of Urban Qualities

In the case of a city the conceived space is primarily formed by conscious decision-making processes within urban governance. The main responsibility of urban governance is the supply of an efficient urban structure by implementing guidelines and regulations in the form of policies and physical planning. These legal frameworks for urban developments are in turn based on visionary decision-making regarding overall development goals and strategies [18]. While urban governance is most responsible for the supply of an efficient urban structure, it is the various users of space themselves who shape the urban environment according to their requirements. This demand-driven development is needed for the urban quality of diversity, which is essential for economic growth and flexibility. In most service-oriented economies three main parties active in spatial practice can be distinguished: developers, companies and inhabitants.

In addition to the conscious planning of individuals and the collective spatial practice, the third dimension of space production is the identification of inhabitants with space. This identification is the main basis for social consolidation because it is rooted in a long-term commitment from inhabitants to the space. The reasons for a close intimacy between inhabitants and urban environments are best described in images – the image of livability, the image of success and the image of cultural values. These three images cooperatively create the identification of a society with its surroundings, which is the basis for the urban quality of identity [14,19].

The preceding three main urban qualities can be differentiated, which in turn are the basis for sustainable urbanism. The supply of an efficient urban structure by urban governance is key to improving the ecological balance of cities. The urban diversity created by the spatial practice of developers, companies and inhabitants is the basis for economic growth and flexibility. The urban identity created by the identification of all social groups with the urban environment is essential for social peace. The model in Fig. 7 illustrates the triadic principles of all the

components that produce the urban environment, its qualities and sustainability factors [14].

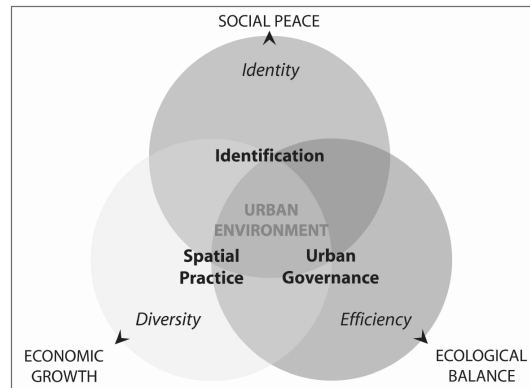


Fig. 7. Mapping Lefebvre's theory on the production of urban qualities (Source: Wiedmann and Salama, 2012)

4.4 Rethinking Architectural Education

Future architects need to understand the production of space in a comprehensive manner since their work lies profoundly in the coordination and integration of all the factors that produce a new space irrespective of its scale. They need a basis of scientific knowledge, for example, about construction techniques, communication and observation skills when they design a building and a sense of intuition to create authentic representations [15]. They should be seen as managers of the process of producing a space and thus should be able to develop the design of a building or a portion of the built environment by integrating three main qualities that include ecological principles, user responsiveness and meaningful images. These three qualities can be mapped back to the conceived, perceived and lived triad. Thus, budding professionals need a wider knowledge base in order to decide on the appropriate construction techniques, to conduct systematic investigation of human behavior and communicate with potential users in order to understand and integrate their needs and to develop the ability to think critically and creatively on how to incorporate design elements into a meaningful whole.

If an architect succeeds in integrating ecological design, user responsiveness and meaning into a project, he/she automatically contributes to the three previously mentioned urban qualities. Thus, by using appropriate construction techniques for ecological buildings an architect plays a significant role in enhancing urban efficiency. When an architect designs a building that successfully satisfies user and community needs, he/she contributes to urban diversity. An architect can also play a significant role in developing urban identity if his/her design reflects the subjective preferences of a society. Consequently, architects play an important role in developing built environments that are ecological, diverse and meaningful (Fig. 8). A considerable number of implications can be derived from this approach toward rethinking the content of knowledge and the way in which such a content

is delivered, practiced, reproduced, or subjected to specific pedagogic orientation.

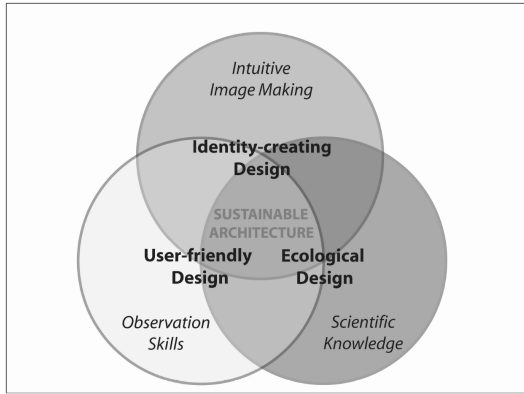


Fig. 8. The role of architectural in developing urban qualities (Source: Wiedmann and Salama, 2012)

5. Conclusion: Evolving Approaches for Sustainable Design

Despite the honest attempts of professionals and educators to tame the development and growth processes, they tend to work on isolated islands, without having enough concern for developing a common language. In the light of the preceding discussion, a concluding narrative can be drawn in an attempt to advance the future discourse on sustainability.

5.1 A Voice for Professional Practice

An approach can be envisioned to have three main qualities: a) being comprehensive since it addresses different phases of the development process, b) being trans-disciplinary since it crosses the boundaries between different fields by utilizing trans-disciplinary knowledge, and being collaborative since it involves both users and teams of experts throughout the process. It is believed that it will act as a remedy for the difficulties inherent in the current outdated approaches, ultimately by dealing equally with the top-down and bottom-up strategies.

The proposed approach adopts the view that sustainability cannot be addressed as one subject; it includes different disciplines and issues requiring systemic thinking. A fuller understanding can be achieved by investigating the key issues simultaneously; not dealing with them separately each at a time. It is envisioned that this approach would include technology and engineering issues; organizational, human and management issues; functional, behavioral and cultural issues; financial issues; and urban and landscape issues. It is also believed that these issues should be integrated within a political, legislative, comprehensive process while learning from the past; the vernacular, the traditional, and the development practices that acquired meaning over time.

In the proposed approach, it is crucial to define the target audience, the building type, the nature of users, and the activities taking place. This approach overcomes the shortcomings of

previous efforts. It accepts the use of guidelines, but views them differently: they should be illustrated and should address professionals and decision makers of different backgrounds, concerns, and agendas. In dealing with the bottom-up approach, the approach envisions workshops as learning mechanisms where the essential characteristics of the subject are abstracted for learning purposes. The aim here is to imbibe the enduring values of the concepts underlying sustainability by involving the client, the user, the engineer, and the facility manager in the process.

Sensitizing building occupants toward the key issues underlying sustainability is an integral component of the proposed approach. In essence, walking tour techniques can be utilized where users tour the building, assessing its qualities from a sustainability perspective. The objective here is to have them comprehend the existing status of the built environment while recognizing ways in which this environment can be improved. Post Occupancy evaluation from both the users and the professionals' perspective is also crucial. The purpose here would be to establish feedback mechanisms for the development of guidelines, and to improve the quality of decision-making.

The outcomes of implementing this approach would be several. It will immediately create a set of tools and procedures: best practice manuals, illustrative guidelines, recommendations in a prioritized manner, assessment manuals, documented workshops and walking tours, and implementation mechanisms. By adopting this approach together with a continued collaborative interdisciplinary effort, it is believed that a process of real sustainable development at all levels can begin to shape the future of the built environment. By addressing the building's users, sustainability will become a teaching tool for the public, and it will be transformed from being a dream, a utopia, or a romantic gesture to something tangible: something whose value as a professional culture is recognized.

5.2 A Voice for Architectural Education

The framework presented based on Lefebvre's theory of space production emphasizes a comprehensive understanding of the architect's role in the development of sustainable urban qualities. In essence, teaching architecture for sustainability has to be based on a holistic view of society and its needs. By developing a curriculum based on a space-production theory, architecture students learn to understand their particular role in making design decisions. They will be prepared to work in interdisciplinary realms since they can gain insights into how other professions interrelate or intervene in the process of production of space. By implementing a general framework that connects the topic of each taught course within a larger picture of space production, including a philosophical discourse, a more integrated understanding of architecture can be transmitted to students rather than simply teaching a piecemeal series of topics.

Subsequently, students learn to understand the role of each knowledge type in a macro context and thus a systematic pedagogy is introduced. The most important aspect that will shift teaching towards creating more awareness about sustainability is the encouragement of students to focus on the built environment and its context within society and its everyday practices. One would refer here to the statement made by Habraken when he argues "*Teaching architecture without teaching how everyday environment works is like teaching medical students the art of healing without telling them how the human body functions. You would not trust a medical doctor who does not know the human body. Knowledge of everyday environment must legitimize our profession...*" (Habraken, 2003, p. 32)."

6. References

- Salama, A.M. (2002). Environmental Knowledge and Paradigm Shifts: Sustainability and Architectural Pedagogy. In: Salama, A.M., O'Reilly W. & Noschis, K. (eds) *Architectural Education Today: Cross Cultural Perspectives*. Lausanne: Comportements. p51-59.
- Lyle J.T. (1993). *Regenerative Design for Sustainable Development*. New York: John Wiley and Sons.
- Davies, I. et al. (eds) (1994). *Sustainable urban projects: Principles of implementation*. Turin: European Academy for the Urban Environment.
- United Nations. (1992). *RIO declaration on environment and development*. Available: www.unep.org/Documents/Multilingual/Default.asp?DocumentID=78&ArticleID=1163. Last accessed 1st Nov. 2013.
- UIA-International Union of Architects. (1993). Declaration of Interdependence for a Sustainable Future. In *UIA/AIA World Congress of Architects*. Chicago, 18-21 June 1993.
- DESA-UN - Department of Economic and Social Affairs (2007). *Indicators of Sustainable Development: Guidelines and Methodologies*. New York/Geneva: United Nations Publications.
- Duxbury, N. (2012). Cities, culture and sustainable development. *Presentation as part of Summer Lab: Art, Climate Change, and Community Development*. Torres Vedras, Portugal, 5 September 2012.
- Salama, A.M. & Adams, W.G. (2003). Designing Sustainable Learning Environments: Rethinking the Missing Dimensions. *AUEJ: Al Azhar University Engineering Journal*. 7 (Special Issue), pR1-1-10
- Salama, A.M. (2009-a). Sustainability / Trans-disciplinarity: A concern for people and environments between confusing terminology and outdated approaches. *INTBAU Online Essays*. 1 (20), pOnline. Available at: <http://www.intbau.org/archive/essay20.htm>.
- Sanoff, H. (2001). *School Building Assessment Methods*. Washington D.C.: National Clearinghouse for Educational Facilities.
- Sanoff, H. (1994). *School Design*. New York: Van Nostrand Reinhold.
- Salama, A.M. (2009-b). The Users in Mind: Utilizing Henry Sanoff's Methods in Investigating the Learning Environment. *Open House International*. 34 (1), p35-44.
- Salama, A.M. (2005). PLADEW: A Tool for Teachers Awareness of School Building Sustainability: The Case of Carmel School, Mathews, North Carolina. *Global Built Environment Review*. 5 (1), p45-56.
- Wiedmann, F. & Salama, A.M. (2012). The Role of Architecture in Producing Urban Qualities for Sustainability: Implications for the Future of Architectural Education. *Malaysian Architectural Education Conference*. University Putra Malaysia, 2012. p20-26.
- Salama, A.M. (2009-c). *Transformative Pedagogy in Architecture and Urbanism*. Solingen: Umbau-Verlag.
- Salama, A.M. (2012). Knowledge and Design: People-Environment Research for Responsive Pedagogy and Practice. *Procedia - Social and Behavioral Sciences*. 49, p.8-27.
- Lefebvre, H. (1991). *The Production of Space*. Oxford: Blackwell.
- Salama, A.M. & Wiedmann, F. (2013). *Demystifying Doha: On Architecture and Urbanism in an Emerging City*. Farnham, UK: Ashgate Publishing Ltd.
- Salama, A. M., Wiedmann, F. & Thierstein, A. (2012). People and the City: Unveiling the Lived Urban Environment of Doha. *Bloomsbury Qatar Foundation Journals*. pAHP36.
- Habraken, J. (2003). Questions that will not Go Away: Some Remarks on Long-term Trends in Architecture and their Impact on Architectural Education - Keynote Speech. In *Proceedings of the Annual Conference of the European Association of Architectural Education – EAAE*. Hania, Crete, Greece, 2003. p32-42.